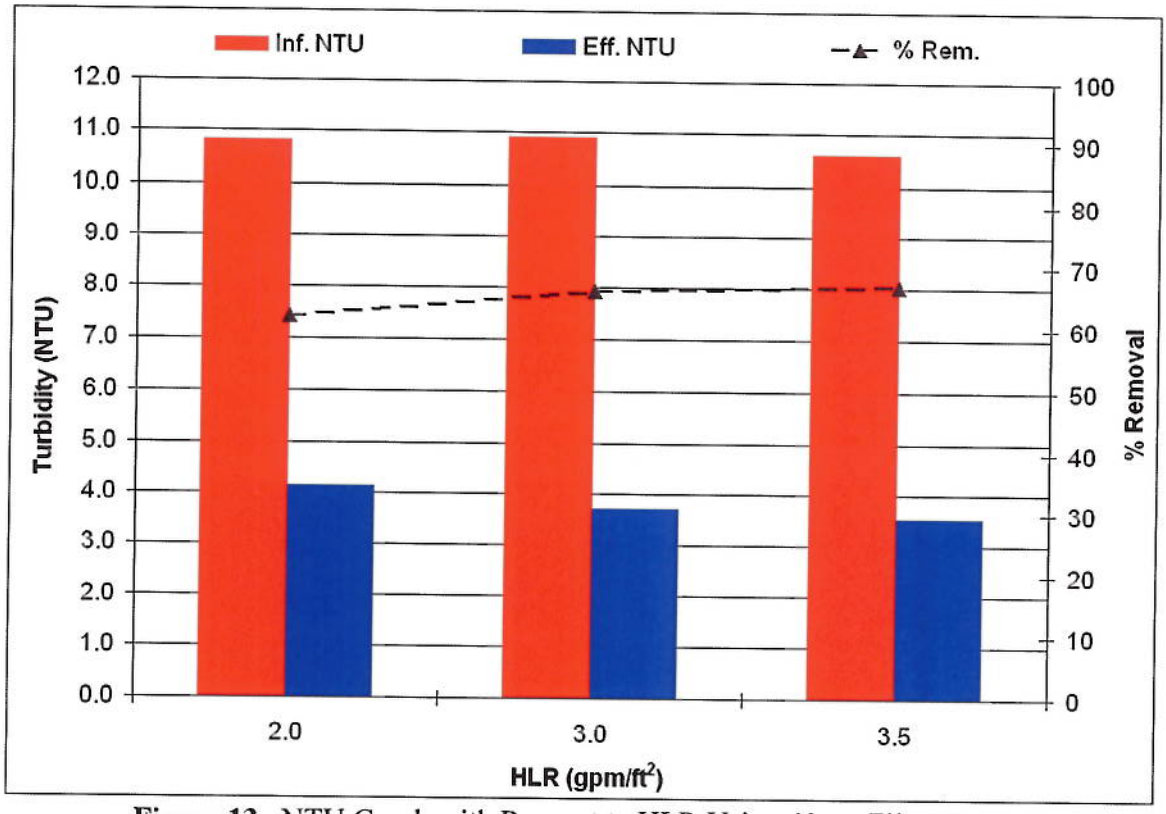


Figure 13. NTU Graph with Respect to HLR Using 40µm Filter Panels

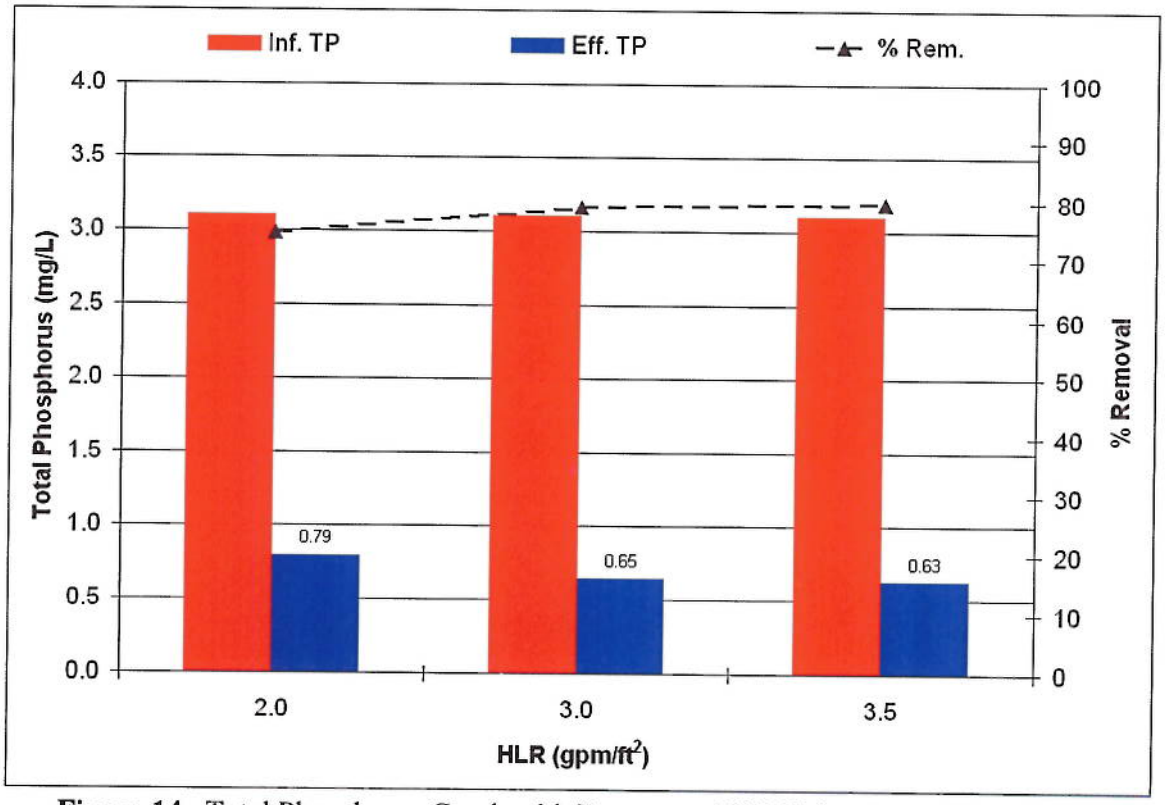


Figure 14. Total Phosphorus Graph with Respect to HLR Using 40µm Filter Panels

The data in Table 9 show that the Discfilter with the 40µm filter panels installed is not able to achieve the same amount of total phosphorus removal. The lowest effluent total phosphorus was seen at a loading rate of 3.5 gpm/ft^2 (58 gpm) and was 0.63 mg/L. This does not accomplish the goal of less than 0.35 mg/L effluent total phosphorus. The static and backwash times also did not increase by more than a couple of seconds. It would be more practical to run with the 10µm filter panels.

5.0 Conclusion

The Hydrotech Discfilter process demonstrated its capability to achieve less than 0.35 mg/L total phosphorus in the effluent using different coagulants and other operating parameters. Depending on the influent total phosphorus level coming into the Hydrotech Discfilter, higher or lower coagulant doses may be needed to maintain an effluent total phosphorus of 0.35 mg/L.

In addition, Discfilter was efficient at removing total phosphorus using both ferric chloride and aluminum sulfate. The Discfilter was capable of treating influent total phosphorus levels over 3.5 mg/L while maintaining less than 0.35 mg/L effluent total phosphorus. The Discfilter was also able to achieve maximum total effluent phosphorus levels of 0.10 mg/L with 70 mg/L of ferric chloride and 1.0 mg/L of Hydrex 6161 (dry anionic) polymer. Aluminum sulfate was able to achieve a maximum effluent total phosphorus level of 0.17 mg/L with a dose of 70 mg/L and 1.0 mg/L of Hydrex 6161 polymer.

Overall, the Discfilter was able to operate continuously and maintain less than 0.35 mg/L of effluent total phosphorus. The final week of testing was performed with aluminum sulfate as the coagulant. During this period of testing, the influent total phosphorus averaged 3.0 mg/L which was lower than the first 2 weeks of testing where it averaged 3.4 mg/L seeing a maximum of 3.7 mg/L. The first week of testing also showed signs of algae present in the influent water stream however, this did not seem to have an effect on the removal of total phosphorus.

Recommendation
Depending on the influent total phosphorus level, the Discfilter will be able to reduce the total phosphorus below 0.35 mg/L. When influent total phosphorus levels are over 3.5 mg/L, a ferric chloride dose of 60 – 70 mg/L would achieve the effluent total phosphorus goal of less than 0.35 mg/L. With an influent total phosphorus level around 3.0 mg/L an aluminum sulfate dose of 50 – 70 mg/L would reach the goal of less than 0.35 mg/L. These coagulant doses combined with a polymer dose around 1.0 mg/L would help accomplish the effluent total phosphorus goals. The Discfilter also provides operational flexibility to achieve lower total phosphorus limits (0.10 mg/l) if needed in the future without modifications to the process train. Additional coagulant is all that is needed to achieve potential lower total phosphorus limits.

APPENDIX A

Date	Time	Flow	HLR	HRT	Coagulant		Polymer		pH		NTU			Backwash				Comments
						Dose		Dose						Static	BW	32-gal	% BW	
		(gpm)	(gpm/ft^2)	(min)	Type	(mg/L)	Type	(mg/L)	Inf.	Eff.	Inf.	Eff.	% Rem.	(sec)	(sec)	(sec)		
3-Nov	8:45	33	2.0	-	-	-	-	-	7.40	7.43	9.20	8.28	10.0	360	18			No Chem Addition (Baseline)
	10:15			18	$FeCl_3$	10	6161	0.30										S/U 2 yr old Ferric
	11:10								7.39	7.23	8.96	8.07	9.9	23	21			
	11:20					20												
	12:05								7.36	7.14	9.16	7.63	16.7	20	27			
	12:15					30												
	13:20								7.33	7.04	8.72	7.20	17.4	23	22			
	13:30					40												
	14:15								7.34	6.93	9.24	6.33	31.5	0	Cont.			
	14:25							0.45										
	15:00								7.32	6.94	8.85	5.64	36.3	11	60			

Date	Time	Flow	HLR	HRT	Coagulant		Polymer		pH		NTU			Backwash				Benchtop TP	TP			Comments
						Dose		Dose						Static	BW	32-gal	% BW					
		(gpm)	(gpm/ft^2)	(min)	Type	(mg/L)	Type	(mg/L)	Inf.	Eff.	Inf.	Eff.	% Rem.	(sec)	(sec)	(sec)		(mg/L)	Inf.	Eff.	% Rem.	
4-Nov	7:15	33	2.0	18	$FeCl_3$	40	6161	0.60														
	8:15								7.31	6.88	8.84	4.95	44.0	16	32			0.70				S/U with old Ferric
	8:20							0.75														
	9:10								7.34	6.87	9.00	4.76	47.1	19	23			1.60				
	9:15							0.90														
	9:50								7.34	6.90	9.08	4.34	52.2	24	21			0.63				
	9:55							1.05														
	10:25								7.33	6.89	9.14	4.11	55.0	30	20			0.52				
	10:55					50																Switch to New Ferric
	12:15								7.39	6.96	8.99	5.25	41.6	28	21			0.74				
	12:30					60		1.20														Begin 3 hr composite sample
	13:20								7.32	6.77	9.10	2.31	74.6	31	20			0.30				
	14:15								7.32	6.75	9.16	1.83	80.0	35	20			0.21	3.7	0.30	91.9	

Date	Time	Flow	HLR	HRT	Coagulant		Polymer		pH		NTU			Backwash				Benchtop TP	Comments
						Dose		Dose						Static	BW	32-gal	% BW		
		(gpm)	(gpm/ft^2)	(min)	Type	(mg/L)	Type	(mg/L)	Inf.	Eff.	Inf.	Eff.	% Rem.	(sec)	(sec)	(sec)		(mg/L)	
5-Nov	7:30	33	2.0	18	$FeCl_3$	50	6161	1.05											
	8:20								7.32	6.87	9.11	5.28	42.0	21	26			0.70	S/U
	8:25					55													
	9:00																		Shut down for IDI setup
	11:00																		S/U
	12:00								7.32	6.78	9.18	3.30	64.1	18	28			0.37	
	12:30					40		0.75											
	13:20								7.38	6.93	9.17	5.71	37.7	26	22				
	13:45																		
	14:15																		Begun adding sulfuric to get pH ~6.50 NTU over 6, S/D

Date	Time	Flow	HLR	HRT	Coagulant	Dose	Polymer	Dose	pH		NTU			Backwash				Alkalinity	Benchtop TP	TP			Comments
														Static	BW	32-gal	% BW						
		(gpm)	(gpm/ft^2)	(min)	Type	(mg/L)	Type	(mg/L)	Inf.	Eff.	Inf.	Eff.	% Rem.	(sec)	(sec)	(sec)		(mg/L)	(mg/L)	Inf.	Eff.	% Rem.	
6-Nov	7:05	33	2.0	18	$FeCl_3$	55	6161	1.05															S/U
	8:00								7.33	6.78	8.98	3.55	60.5	23	25				0.96				Ext. Run
	9:00								7.34	6.74	9.07	3.27	63.9	29	21	1090	5.3		0.41				
	10:00								7.40	6.84	9.01	2.29	74.6	27	22	1221	4.7		0.36				
	11:00								7.39	6.78	8.95	2.05	77.1	28	21	1296	4.4	160					
	12:00								7.34	6.74	9.15	2.05	77.6	30	20					3.5	0.46	86.9	

Date	Time	Flow	HLR	HRT	Coagulant	Dose	Polymer	Dose	pH		NTU			Backwash				Alkalinity	Benchtop TP	TP			Comments
														Static	BW	32-gal	% BW						
		(gpm)	(gpm/ft^2)	(min)	Type	(mg/L)	Type	(mg/L)	Inf.	Eff.	Inf.	Eff.	% Rem.	(sec)	(sec)	(sec)		(mg/L)	(mg/L)	Inf.	Eff.	% Rem.	
9-Nov	7:15	33	2.0	18	$FeCl_3$	50	6161	0.90															S/U
	8:20								7.37	6.84	8.91	4.30	51.7	22	24			160	0.60				Ext. Run
	9:30								7.34	6.85	9.03	4.04	55.3	13	32			160	0.55				
	9:35							1.00															
	10:30								7.33	6.79	9.03	3.61	60.0	19	25			180	0.48				
	11:30								7.32	6.74	8.90	3.28	63.1	23	21			160	0.40				
	13:15								7.32	6.76	9.18	3.05	66.8	28	22			160	0.38				
	14:15								7.33	6.74	9.10	3.07	66.3	25	21			140	0.39	3.3	0.67	79.7	Composite
	14:30					70																	
	15:10									6.55		0.98		35	21				0.08				

Date	Time	Flow	HLR	HRT	Coagulant	Dose	Polymer	Dose	pH		NTU			Backwash				Alkalinity	Benchtop TP	TP			Comments
														Static	BW	32-gal	% BW						
		(gpm)	(gpm/ft^2)	(min)	Type	(mg/L)	Type	(mg/L)	Inf.	Eff.	Inf.	Eff.	% Rem.	(sec)	(sec)	(sec)		(mg/L)	(mg/L)	Inf.	Eff.	% Rem.	
10-Nov	7:10	33	2.0	18	$FeCl_3$	70	6161	1.00															S/U
	8:00								7.39	6.69	8.99	1.33	85.2	31	21			140	0.12				Ext. Run Max TP removal
	9:00								7.40	6.67	9.05	0.89	90.1	31	20	1277	4.5	160	0.08				
	10:00								7.35	6.59	9.20	0.87	90.6	30	20		4.4	160	0.07				
	11:00								7.33	6.54	9.22	0.87	90.5	29	19			160	0.08				
	12:00								7.32	6.55	9.14	0.90	90.2	30	20			140	0.09				
	13:00								7.32	6.56	9.36	1.10	88.2	30	21			160	0.07	3.3	0.10	97.0	

Date	Time	Flow	HLR	HRT	Coagulant	Dose	Polymer	Dose	pH		NTU			Backwash				Alkalinity	Benchtop TP	TP			Comments
														Static	BW	32-gal	% BW						
		(gpm)	(gpm/ft^2)	(min)	Type	(mg/L)	Type	(mg/L)	Inf.	Eff.	Inf.	Eff.	% Rem.	(sec)	(sec)	(sec)		(mg/L)	(mg/L)	Inf.	Eff.	% Rem.	
11-Nov	7:10	33	2.0	18	$FeCl_3$	60	6161	1.00															S/U
	8:00								7.34	6.76	9.14	2.24	75.5	25	22			140	0.30				
	9:00								7.31	6.70	8.85	1.67	81.1	26	20			140	0.20				
	10:00								7.28	6.70	8.73	1.60	81.7	29	19			180	0.19				
	11:00								7.29	6.66	8.85	1.43	83.8	29	21			160	0.16				
	12:00								7.28	6.69	8.86	1.60	81.9	31	21			160	0.17				
	13:00								7.28	6.68	9.09	1.65	81.8	32	19	1273	4.5	160	0.18				
	14:00								7.32	6.64	9.15	1.55	83.1	30	20			160	0.17	3.2	0.24	92.5	

Discfilter Pilot Study Report
Newport, NH

Final Report

I. Kruger Inc.
January 26, 2010

Date	Time	Flow	HLR	HRT	Coagulant		Polymer		pH		NTU			Backwash				Alkalinity	Benchtop TP	TP			Comments
						Dose		Dose						Static	BW	32-gal	% BW						
		(gpm)	(gpm/ft²)	(min)	Type	(mg/L)	Type	(mg/L)	Inf.	Eff.	Inf.	Eff.	% Rem.	(sec)	(sec)	(sec)		(mg/L)	(mg/L)	Inf.	Eff.	% Rem.	
12-Nov	7:15	50	3.0	12	$FeCl_3$	60	6161	1.00															S/U
	8:15								7.41	6.81	9.09	1.65	81.8	12	45			140	0.16	3.3	0.18	94.5	10 um
	8:40	58	3.5	10		60		1.00															
	9:40								7.38	6.79	9.19	1.38	85.0	9	66			140	0.14	3.3	0.17	94.8	10 um
	10:45	33	2.0	18		60		1.00															
	15:30								7.37	6.82	9.25	6.18	33.2	20	24				0.70	3.3	0.91	72.4	40 um

Date	Time	Flow	HLR	HRT	Coagulant		Polymer		pH		NTU			Backwash				Benchtop TP	TP			Comments
						Dose		Dose						Static	BW	32-gal	% BW					
		(gpm)	(gpm/ft²)	(min)	Type	(mg/L)	Type	(mg/L)	Inf.	Eff.	Inf.	Eff.	% Rem.	(sec)	(sec)	(sec)		(mg/L)	Inf.	Eff.	% Rem.	
13-Nov	7:50	33	2.0	18	$Al_2(SO_4)_3$	75	6161	1.00														S/U
	8:30								7.35	6.83	9.31	2.73	70.7	-	Cont.			0.27				10 um panels
	8:45							1.15														
	9:00								7.35	6.99	9.51	3.05	67.9	7	131			0.38				
	10:00								7.34	6.98	9.47	2.36	75.1	10	118			0.32				
	11:00								7.40	6.97	9.47	1.85	80.5	11	60			0.26				
	12:00								7.34	6.97	9.42	1.72	81.7	13	40			0.21	3.3	0.36	89.1	Potentially clogged nozzles

Date	Time	Flow	HLR	HRT	Coagulant		Polymer		pH		NTU			Backwash				Benchtop TP	TP			Comments
						Dose		Dose						Static	BW	32-gal	% BW					
		(gpm)	(gpm/ft²)	(min)	Type	(mg/L)	Type	(mg/L)	Inf.	Eff.	Inf.	Eff.	% Rem.	(sec)	(sec)	(sec)		(mg/L)	Inf.	Eff.	% Rem.	
16-Nov	7:30	33	2.0	18	$Al_2(SO_4)_3$	80	6161	1.00														S/U
	8:15								7.37	6.95	10.30	1.60	84.5	10	78			0.19				Clogged Nozzles replaced
	9:00								7.33	6.95	10.30	1.37	86.7	19	27			0.17				
	10:00								7.37	6.96	10.10	1.20	88.1	22	26			0.13				
	11:00								7.33	6.92	10.20	1.07	89.5	24	25	1052	5.5	0.12				
	12:00								7.31	6.90	10.10	0.97	90.4	27	25			0.13				
	13:00								7.35	6.90	10.40	0.95	90.9	27	26	1096	5.3	0.12				
	14:00								7.41	6.97	10.10	1.20	88.1	27	25			0.12	2.8	0.17	93.9	
	14:30					70		1.00														Prepared for overnight run

Date	Time	Flow	HLR	HRT	Coagulant		Polymer		pH		NTU			Backwash				Benchtop TP	TP			Comments
						Dose		Dose						Static	BW	32-gal	% BW					
		(gpm)	(gpm/ft²)	(min)	Type	(mg/L)	Type	(mg/L)	Inf.	Eff.	Inf.	Eff.	% Rem.	(sec)	(sec)	(sec)		(mg/L)	Inf.	Eff.	% Rem.	
17-Nov	7:00	33	2.0	18	$Al_2(SO_4)_3$	70	6161	1.00	7.39	6.97	10.10	0.92	90.9	23	27			0.11				S/U
	8:00								7.42	7.00	10.20	0.98	90.4	24	27			0.11				
	9:00								7.38	6.98	10.20	1.04	89.8	26	26			0.17				
	10:00								7.38	6.95	10.20	1.07	89.5	27	22	988	5.8	0.12				
	11:00								7.37	6.97	10.20	1.00	90.2	26	22	1036	5.6	0.17				
	12:00								7.41	7.01	10.20	1.00	90.2	27	22	1080	5.4	0.12				
	13:00								7.32	6.99	10.10	1.05	89.6	27	22				2.9	0.17	94.1	
	14:00					60		1.00														Prepared for overnight run

Date	Time	Flow	HLR	HRT	Coagulant		Polymer		pH		NTU			Backwash				Benchtop TP	TP			Comments
						Dose		Dose						Static	BW	32-gal	% BW					
		(gpm)	(gpm/ft²)	(min)	Type	(mg/L)	Type	(mg/L)	Inf.	Eff.	Inf.	Eff.	% Rem.	(sec)	(sec)	(sec)		(mg/L)	Inf.	Eff.	% Rem.	
18-Nov	7:15	33	2.0	18	$Al_2(SO_4)_3$	60	6161	1.00	7.38	6.99	10.30	1.09	89.4	27	25			0.13				S/U
	8:00								7.42	7.06	10.30	1.10	89.3	25	26			0.17				
	9:00								7.42	7.08	10.30	1.09	89.4	26	26			0.15				
	9:40					50																Lower Coag to hit break point
	10:15								7.35	7.06	10.10	1.24	87.7	27	22			0.20				
	11:00								7.34	7.09	10.20	1.30	87.3	26	21			0.23				
	11:40					40																
	12:00								7.44	7.18	10.20	1.65	83.8	22	26			0.32				
	13:00								7.44	7.21	10.00	2.01	79.9	23	27			0.49				
	14:00								7.43	7.22	10.50	1.89	82.0	23	24			0.45				
	14:30					50		1.00											3.1	0.31	90.0	Prepared for overnight run

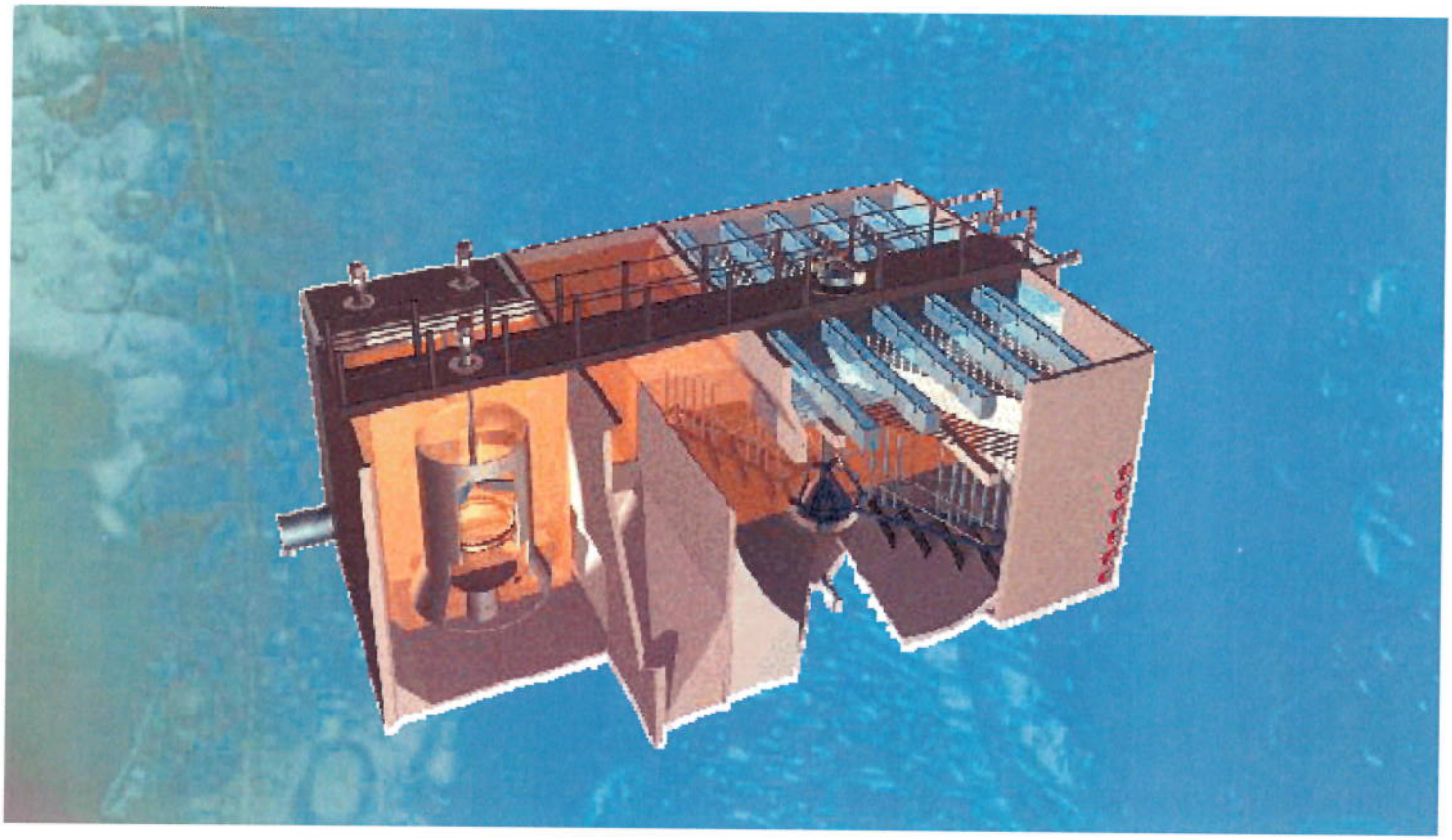
Date	Time	Flow	HLR	HRT	Coagulant		Polymer		pH		NTU			Backwash				Benchtop TP	TP			Comments
						Dose		Dose						Static	BW	32-gal	% BW					
		(gpm)	(gpm/ft^2)	(min)	Type	(mg/L)	Type	(mg/L)	Inf.	Eff.	Inf.	Eff.	% Rem.	(sec)	(sec)	(sec)		(mg/L)	Inf.	Eff.	% Rem.	
19-Nov	7:15	33	2.0	18	$Al_2(SO_4)_3$	50	6161	1.00	7.41	7.05	10.80	1.52	85.9	24	24			0.34				S/U with 10um panels performing HLR analysis
	7:30	50	3.0	12		50		1.00														
	8:00								7.35	7.10	11.00	1.26	88.5	12	40			0.24				
	8:30								7.43	7.13	10.30	1.32	87.2	11	46			0.26				
	8:45	58	3.5	10		50		1.00														
	9:00								7.42	7.04	10.60	1.34	87.4	7	101			0.25				
	9:45								7.38	7.10	10.60	1.47	86.1	8	105			0.26				
	10:40	58	3.5	10		50		1.00														Switch to 40um panels
	11:45								7.42	7.13	10.60	3.51	66.9	11	40			0.58				
	12:00	50	3.0	12		50		1.00														
	13:00								7.39	7.05	10.90	3.70	66.1	13	32			0.60				
	13:15	33	2.0	18		50		1.00														
	14:15								7.33	7.08	10.80	4.12	61.9	28	20			0.59				

Flow	HLR	HRT	Coagulant		Polymer		pH		NTU			Backwash		TP (mg/L)			OP (mg/L)		TSS (mg/L)		UV_{254} %T/cm-1		Alkalinity CaCO3		BOD (mg/L)	
				Dose		Dose						Static	BW													
(gpm)	(gpm/ft^2)	(min)	Type	(mg/L)	Type	(mg/L)	Inf.	Eff.	Inf.	Eff.	% Rem.	(sec)	(sec)	Inf	Eff	% Rem	Inf	Eff	Inf	Eff	Inf.	Eff.	Inf.	Eff.	Inf	Eff
33	2.0	18	$FeCl_3$	60	6161	1.20	7.32	6.76	9.13	2.07	77.3	33	20	3.7	0.31	91.6	2.7	<0.05	6	5	51	60	130	88	8	<6
33	2.0	18	$FeCl_3$	55	6161	1.05	7.36	6.78	9.03	2.64	70.8	27	22	3.5	0.46	86.9	2.7	0.06	<5	<5	51	59	130	92	<6	<6
33	2.0	18	$FeCl_3$	50	6161	1.00	7.34	6.79	9.03	3.59	60.2	22	24	3.3	0.67	79.7	2.5	0.10	6	<5	47	46	130	95	<6	<6
33	2.0	18	$FeCl_3$	70	6161	1.00	7.35	6.60	9.16	0.99	89.2	30	20	3.3	0.10	97.0	2.4	<0.05	7	<5	46	70	130	75	<12	<6
33	2.0	18	$FeCl_3$	60	6161	1.00	7.30	6.69	8.95	1.68	81.2	29	20	3.2	0.24	92.5	2.3	<0.05	5	6	53	72	130	84	<12	<6
50	3.0	12	$FeCl_3$	60	6161	1.00	7.41	6.81	9.09	1.65	81.8	12	45	3.3	0.18	94.5	2.2	<0.05	6	<5	52	73	120	84	<6	<6
58	3.5	10	$FeCl_3$	60	6161	1.00	7.38	6.79	9.19	1.38	85.0	9	66	3.3	0.17	94.8	2.2	<0.05	6	<5	53	73	120	84	<6	<6
33	2.0	18	$FeCl_3$	60	6161	1.00	7.37	6.82	9.25	6.18	33.2	20	24	3.3	0.91	72.4										
33	2.0	18	$Al_2(SO_4)_3$	75	6161	1.00	7.36	6.95	9.44	2.34	75.2	10	87	3.3	0.36	89.1	2.2	<0.05	16	<5	46	71	130	99	<12	<6
33	2.0	18	$Al_2(SO_4)_3$	80	6161	1.00	7.35	6.94	10.21	1.19	88.3	24	26	2.8	0.17	93.9	2.3	<0.05	7	<5	47	74	130	94	<12	<6
33	2.0	18	$Al_2(SO_4)_3$	70	6161	1.00	7.38	6.98	10.17	1.01	90.1	26	24	2.9	0.17	94.1	2.3	<0.05	9	<5	46	76	120	95	<12	<6
33	2.0	18	$Al_2(SO_4)_3$	50	6161	1.00	7.41	7.05	10.80	1.52	85.9	24	24	3.1	0.34	89.0	2.1	0.09	5	<5	47	72	130	100	<60	<6
50	3.0	12	$Al_2(SO_4)_3$	50	6161	1.00	7.39	7.12	10.65	1.29	87.9	12	43	3.1	0.31	90.0	2.1	0.10	5	<5	47	72	130	100	<60	<6
58	3.5	10	$Al_2(SO_4)_3$	50	6161	1.00	7.40	7.07	10.60	1.41	86.7	8	103	3.1	0.29	90.6	2.3	0.09	8	<5	45	69	120	100	<60	<6
58	3.5	10	$Al_2(SO_4)_3$	50	6161	1.00	7.42	7.13	10.60	3.51	66.9	11	40	3.1	0.63	79.7	2.3	0.13	8	7	45	69	120	100	<60	<6
50	3.0	12	$Al_2(SO_4)_3$	50	6161	1.00	7.39	7.05	10.90	3.70	66.1	13	32	3.1	0.65	79.0	2.3	0.13	8	7	45	69	120	100	<60	<6
33	2.0	18	$Al_2(SO_4)_3$	50	6161	1.00	7.33	7.08	10.80	4.12	61.9	28	20	3.1	0.79	74.5	2.3	0.13	8	7	45	69	120	100	<60	<6

Appendix G

INFILCO DEGREMONT INC.

DensaDeg® -High-Rate Clarifier/Thickener
Preliminary Budget Proposal



Project: Newport WWTP
Engineer: AECOM
IDI Proposal: 50095201.02 – REV 1
Date: January 20, 2010

INFILCO DEGREMONT INC.
8007 DISCOVERY DRIVE, RICHMOND, VA 23229 USA
P.O. BOX 71390, RICHMOND, VA 23255-1390 USA
TEL 804 756-7600 | FAX 804 756-7643

January 20, 2010

Attn: Ms. Karla L. King, P.E.
Project Engineer - WATER
1231 Concord, MA

Subject: DensaDeg® Clarifier/Thickener Budget Proposal –Newport, NH
IDI Proposal No. – 50095201.02 – REV 1

Dear Karla:

In accordance with your recent request, we are pleased to submit our DensaDeg® clarifier/thickener proposal for the following:

- Two (2) 1.4-MGD clarifier/thickener units with auxiliaries. Units are sized to hydraulically pass 3-MGD each or total of 6-MGD.

We have endeavored to provide complete information here, but if you have any questions or do need additional information please don't hesitate to contact me at 800.446.1150 at your convenience.

Sincerely,

Ryan J. Hess
Product Leader – Separations Group
Infilco Degremont, Inc.

TABLE OF CONTENTS

1. ABOUT INFILCO DEGREMONT, INC.

Infilco Degremont, Inc. (IDI) offers a full array of integrated water solutions in the U.S. and throughout the world. Infilco is a part of SUEZ Environment and Degremont Group, which is located in 65 countries, serving over 1 billion people with water and wastewater solutions.

IDI offers an array of water, wastewater and industrial treatment solutions for any size client. Headworks, clarification, filtration, biological and disinfection systems are several of the product disciplines in our portfolio, which include product offerings such as bar screens, clarifiers, thickeners, filters, nutrient removal systems, biological filter systems, UV disinfection, MBBR, incineration, RO, membranes and complete industrial systems.

With a variety of filtration and clarification products in our SEPARATIONS department, Infilco engineers carefully evaluate each application to provide the most cost-effective and efficient treatment solution.

If interested in this product, check out some of the complimentary SEPARATIONS products:

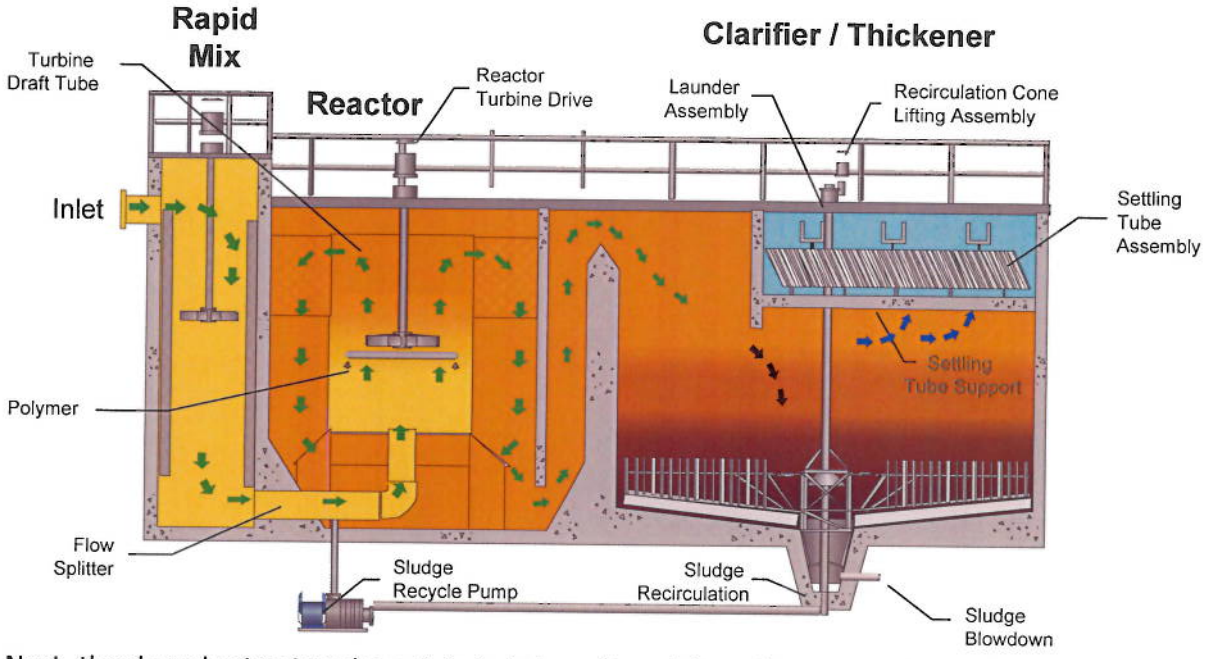
- SuperPulsator® Clarifier
- AquaDAF® DAF Clarifier
- Accelator® Clarifier, Softener
- Greenleaf® Filter System
- Monoflor®-HD Nozzle Underdrains (including air scour, surface sweep & wash troughs)

Our technologies are longstanding market references, like the Climber Screen® Mechanical Bar Screen, ABW® Traveling Bridge Filter, and Cannon® Digester Mixing System. IDI continues to be the technology leader in the industry with technological advances such as the AquaDAF® High-rate Dissolved Air Flotation System, Thermylis® High Temperature Fluid Bed Incinerator, Biofor™ Biological Aerated Filter, and Meteor® ActiveCell for nutrient removal, among many other solutions.

Feel free to visit our website at www.degremont-technologies.com

2. DENSADEG® PROCESS DESCRIPTION

Raw water enters the system and is chemically altered for coagulation in a rapid mix tank. The water is then transferred into the reaction zone and introduced through the base of the reactor basin and discharged beneath an axial flow impeller. Inside this draft tube, polymer is injected through a distribution ring to aid in the flocculation and settling ability of the coagulated particles. Recycled solids are introduced in the inlet pipe to the reactor to aid in flocculation. The movement of the impeller provides sufficient energy for the mixing of the chemicals and raw water. It additionally acts as an axial flow pump by drawing previously formed solids, which settle external to the flume, into the base of the flume. This internal recycling of previously formed solids enhances the solids contact process and increases the speed of the reactions.



Next, the densely structured precipitate is transitioned from the reactor basin through a piston flocculation zone to the clarification and thickening zone. As the water flows under the baffle and upwards into the tubes, the solids downward momentum carries them to the bottom of the thickener basin. Here the solids are allowed to thicken with the aid of a slowly rotating scraper mechanism that pushes the sludge into a sludge hopper located at the bottom of the clarifier/thickener basin. The thickened sludge (2-4%) is periodically discharged from the hopper.

A part of the sludge inventory is recycled back to the reactor basin, thereby increasing the solids in the reactor and improving the performance of the process. Clarified water proceeds beneath the aforementioned baffle into the clarification zone. Additional solids removal is achieved by the use of tubes incorporated into the top of the clarification zone. Moving through the tubes, finished water is collected through a series of launders or laterals which discharge treated water into the effluent trough.

3. DENSADEG® DESIGN BRIEF

SIZING CRITERIA

Application ..... Tertiary Phosphorous Removal
Model No. ..... #7
Basin Type ..... Concrete
Total Max Month Flow ..... 2.8 MGD
Number of Units ..... 2 N
Max Month Flow per Unit ..... 1.4 MGD
Peak Day Loading Rate ..... 7.5 gpm/ft^2

INSTALLATION

Estimated Total Concrete* ..... 275 yd^3
(Includes: Rapid Mix, Clarifier & basin slabs)
(Assumes 15" basin slabs; 12" interior/exterior walls)

OPERATION & MAINTENANCE

Estimated **Installed** Power Consumption*..... 276 kw-hr/d (**ALL** units running)

Estimated Coagulant Consumption*..... Lab Analysis Required
Estimated Polymer Consumption*..... 0.5 to 1.0 ppm

Equipment Maintenance: As with all mechanical equipment, lubricate all motors, gear reducers, and accessory equipment as directed by the manufacturer's instructions. Inspect the sludge valve, timers and proportioning devices periodically to determine proper operation. Lubricate and clean as directed by manufacturer's instructions.

Basin Cleaning: As with any clarifier unit, the unit should be drained and inspected for scaling/solids buildup every 6-12 months. Any scale deposits/solids buildup should be removed. Note scale/solids accumulation especially in rotating parts (impellers, etc).

*Estimates are based on previously executed projects or preliminary data and are provided as a courtesy and are for estimating purposes only. Actual quantities may vary.

4. STANDARD SCOPE OF SUPPLY

Infilco proposes to furnish the following equipment for **each** unit (unless noted):

RAPID MIXER

1. One (1) rapid mixer including a carbon steel support bridge shall be provided. All wetted parts shall be 304SS. The motor shall be a 2.0-hp, TEFC, 230-460/60/3, inverter duty. The mixer shall be sized per Infilco's recommendation.

REACTOR

2. One (1) inner draft tube assembly shall be provided to promote proper recirculation and flocculation, is suspended within the walls. The draft tube and all other internal components, baffles, etc., shall be carbon steel.

3. One (1) reactor turbine shall be provided to produce mixing, precipitation, and recirculation of solids drives the axial flow turbine. The motor shall be a 2.0-hp, TEFC, 230-460/60/3, inverter duty. The turbine consists of curved blades especially designed to result in a high-efficiency, low-shear pump and is provided with a mechanical variable speed drive.

4. One (1) carbon steel polymer distribution ring.

CLARIFIER/THICKENER

5. One (1) scraper mechanism shall consist of a torque tube with collector arms. A center scraper shall extend below the torque tube into the sludge hopper. The collector arms and center scraper shall be fabricated of carbon steel.

6. One (1) scraper drive shall be provided with mechanical variable speed. The motor shall be minimum 0.5-hp, TEFC, 230-460/60/3, severe duty. A torque overload device and visual torque indicator gauge shall be furnished with the drive.

7. Tube settling modules - 2'-0" high settling tubes, including supports. The tubes shall be fabricated from ABS or polystyrene sheets and vacuum-formed to give a corrugated cross section. Other tube setting components shall be fabricated from carbon steel.

8. Adjustable Sludge Draw-off - An adjustable sludge draw-off system shall be furnished for the recycle system including three manual draw-off valves or integral cone adjustment on the scraper drive.

9. Effluent collection troughs, V-notch weir type, shall be sized and provided for effluent water collection above the tube settling. The troughs shall be fabricated from FRP.

10. Sampling System - The clarifier basin is supplied with a sludge sampling system; taps, valves, piping, and sink. Drain piping from the sink is by Others.

11. All necessary 304 SS anchor bolts, u-bolts, and hardware associated with the clarifier/thickener components.

PUMPS

12. Three (3) Recycle Pumps– One (1) duty progressive cavity pumps, plus one spare per two units shall be furnished for each clarifier to recycle preformed solids from the clarifier-thickener basin to the reactor inlet. The motor shall be a 3.0-hp, TEFC, 230-460/60/3, inverter duty. The pump shall be capable of recycling a maximum of 6% the influent flow at 21-feet of discharge head.

13. Skid mounting, complete with piping, of the recycle and blowdown pumps is offered at a cost adder. Sludge blowdown may require pumping, if gravity flow is not possible.

VALVES

14. The following process valves shall be provided:

Item Description	Qty	SIZE	Type/Actuator
Recycle Pump Isolation	6	3"	Plug - Lever
Sludge Blowdown Pump Isolation	4	3"	Plug - Lever
Sample Lines	18	¾"	Sch 80 PBC Ball - Manual
Seal Water Isolation	3	½"	Ball - Manual
Seal Water Control	3	½"	Solenoid – Electric
Seal Water Check	3	½"	Check
Pressure Reducing Valve (seal water)	3	½"	Pressure Reducing
Quick Tube Drain	2	6"	Knife Gate - Manual

INSTRUMENTS

15. The following process instruments shall be provided:

Item Description	Qty	SIZE	Type/Actuator
Recycle Flowmeter	2	3"	Magmeter
Pressure Switch/Gauge (recycle/sludge pumps)	6	--	Ashcroft
Seal Water Rotameter	3	½"	
Seal Water Flow Switch	3	½"	

CONTROL PANEL

16. There shall be furnished one (1) control panel (TOTAL) of NEMA 4X (FRP) construction. The control panel shall contain an Allen-Bradley PLC and PanelView HMI for all logic and control functions, wiring, etc., required to operate the DensaDeg®. All motors starters & VFD's shall be provided by Others.

WALKWAYS

17. A 36"-wide (minimum) walkway and support bridge shall be fabricated of carbon steel to span the reactor and clarifier thickener basins. Aluminum handrails (1-1/2"), grating and kickplates (4") are included. The platform shall expand at the rapid mixer, reactor and clarifier basins and support the mixer drives.

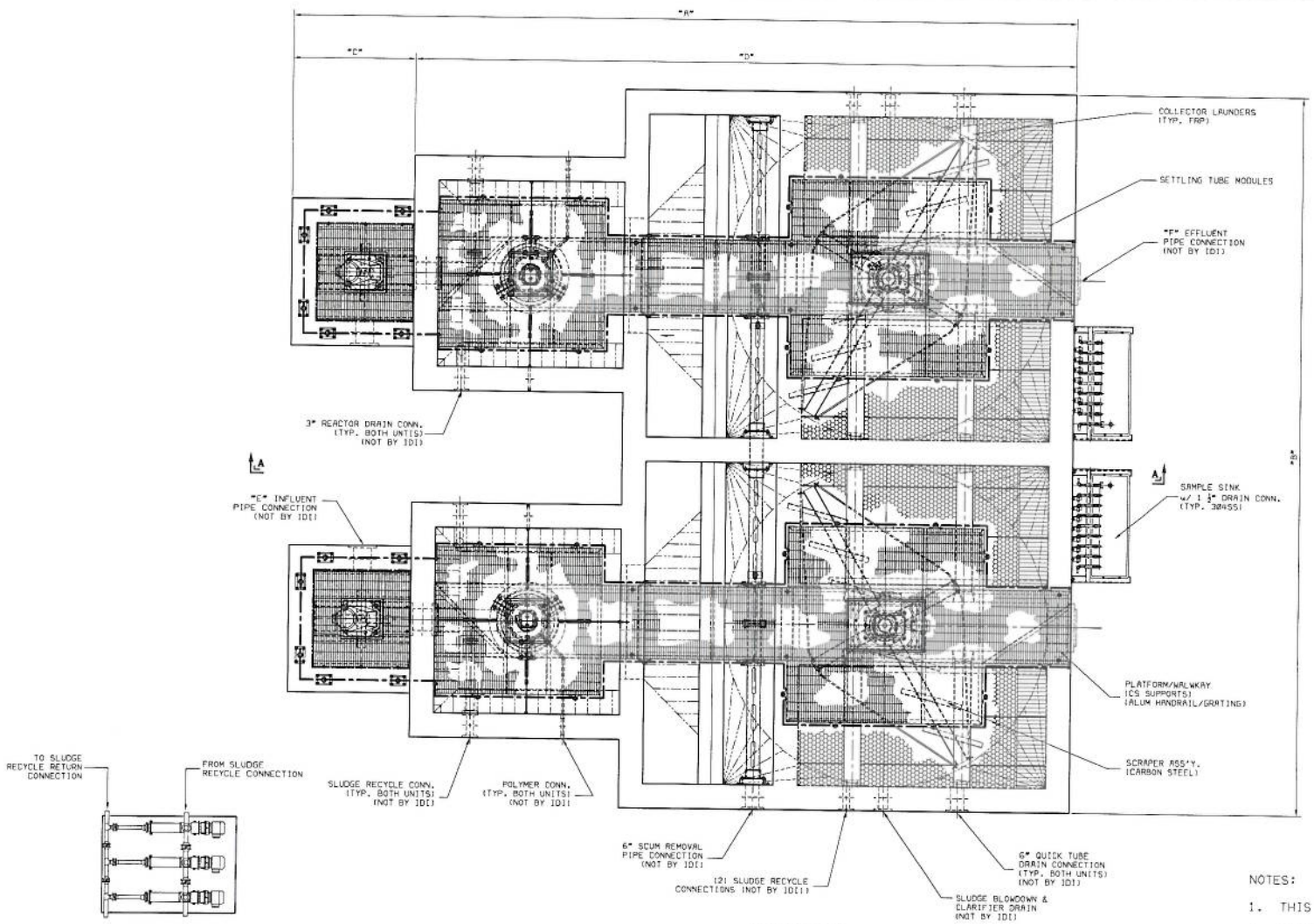
FIELD SERVICE

18. Fifteen (15) days of service - Shall be supplied for construction inspections, start-up and performance testing in no more than four (4) trips to the jobsite.

SCOPE OF SUPPLY BY OTHERS

1. Installation of any kind and unloading & placement of equipment
2. All concrete basins & grout
3. Inlet, outlet, transfer and sludge blowdown piping
4. All access stairs external to the DensaDeg unit
5. All chemical feed systems
6. Building or cover (if desired)
7. All basin drains and drain valves
8. Supply and installation of all electrical power and control wiring and conduit to the equipment served plus interconnections between the Infilco equipment as required, including wire, cable, junction boxes, fittings, conduit, cable trays, safety disconnect switches, circuit breakers, etc.
9. Install and provide all motor control centers, motor starters, VFD's, field wiring, wireways, supports and transformers
10. All embedded pipe sleeves
11. All other necessary equipment and services not otherwise listed as specifically supplied by Infilco

5. PRELIMINARY DRAWINGS



SLUDGE RECYCLE PUMPS
(LOCATION TBD BY ENGINEER)

PLAN VIEW

GENERAL LEGEND	SYMBOL	VALUE	UNITS
OVERALL LENGTH	A	37.50	FT
OVERALL WIDTH (2 units)	B	36.0	FT
RAPID MIX BASIN LENGTH	C	5.0	FT
REACTOR/CLARIFIER LENGTH	D	32.50	FT
INLET PIPE DIAMETER	E	14	IN
EFFLUENT PIPE DIAMETER	F	18	IN

NOTES:

1. THIS DRAWING IS PRELIMINARY & NOT FOR CONSTRUCTION
2. DESIGN OF CONCRETE STRUCTURES IS BY OTHERS
3. DIMENSIONS ASSUME 12" THK. INTERNAL/EXTERNAL WALLS.
4. ORIENTATION OF PIPE CONNECTONS TBD BY ENGINEER
5. RAPID MIXER MAY BE DESIGNED AS COMMON FOR ALL UNITS

REV	REVISION DESCRIPTION	DRAWN	CHECKED	APP	DATE
-	ORIGINAL ISSUE				

PROJECT INFORMATION

Infilco Degremont, Inc.
Post Office Box 71390
Richmond, Virginia 23255-1390
(800) 446-1150

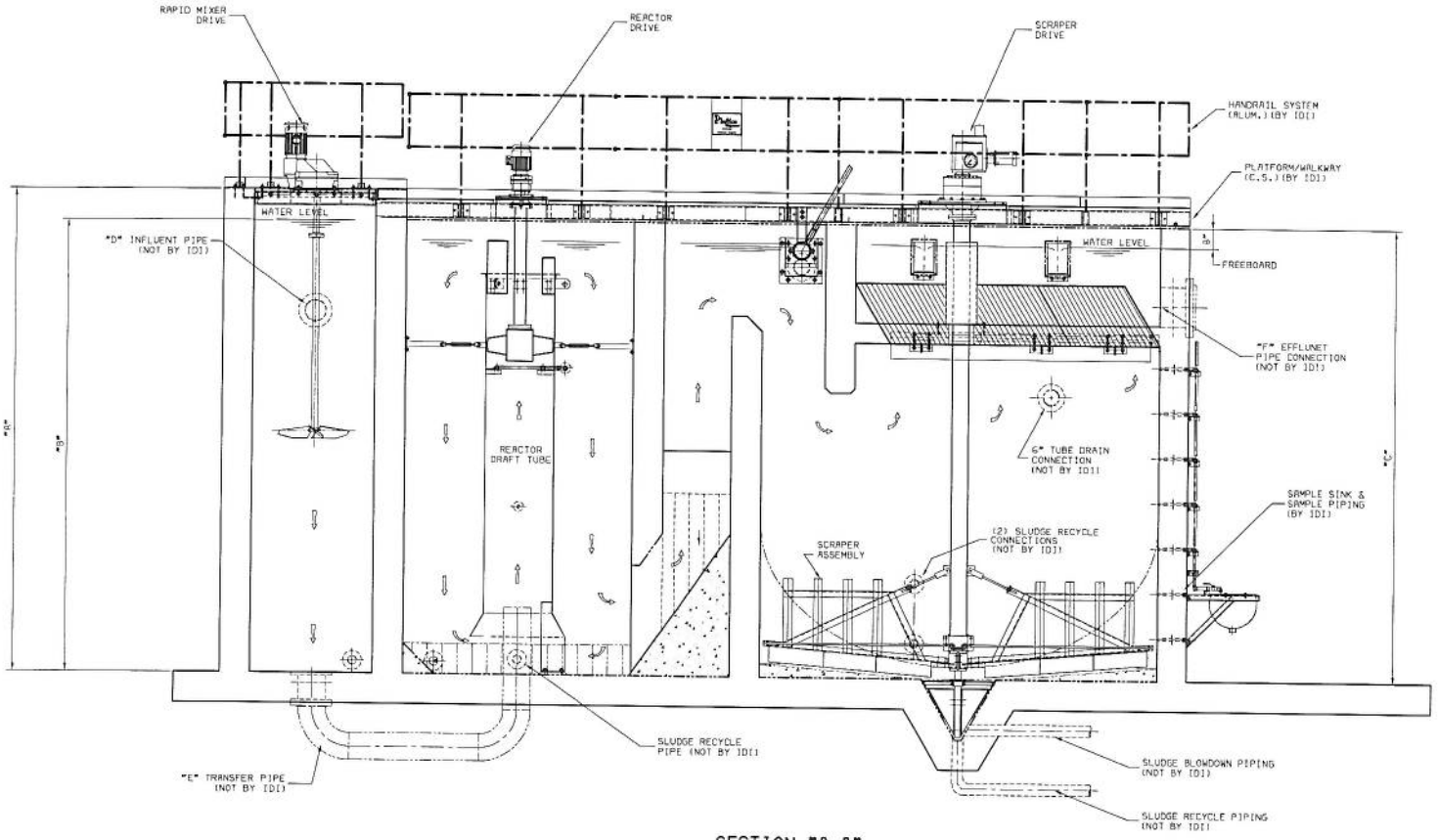
	BY	DATE
DRAWN		
CHECKED		
APP		
REV		

DO NOT SCALE
SCALE N.T.S.

GENERAL ARRANGEMENT
PLAN
DENSADEG

SIZE D | DWG NO -001 | REV E

GENERAL LEGEND	SYMBOL	VALUE	UNITS
RAPID MIX BASIN HEIGHT	A	17.5	FT
RAPID MIX WATER LEVEL	B	16.25	FT
CLARIFIER BASIN HEIGHT	C	16.50	FT
INLET PIPE DIAMETER	D	14	IN
TRANSFER PIPE DIAMETER	E	14	IN
EFFLUENT PIPE DIAMETER	F	18	IN



SECTION "A-A"

NOTES:

1. THIS DRAWING IS PRELIMINARY & NOT FOR CONSTRUCTION
2. DESIGN OF CONCRETE STRUCTURES IS BY OTHERS
3. DIMENSIONS ASSUME 12" THK. INTERNAL/EXTERNAL WALLS.
4. ORIENTATION OF PIPE CONNECTONS TBD BY ENGINEER

REV	REVISION DESCRIPTION	DRAWN	CHECKED	APP	DATE

REV	REVISION DESCRIPTION	DRAWN	CHECKED	APP	DATE
-	ORIGINAL ISSUE				

PROJECT INFORMATION

Infilco Degremont, Inc.
Post Office Box 71390
Richmond, Virginia 23255-1390
(800) 446-1150

	BY	DATE
DRAWN		
CHECKED		
APP		
REF.		

DO NOT SCALE
SCALE N.T.S.

GENERAL ARRANGEMENT
SECTION
DENSADEG

SIZE D | DWG -002 | REV E

6. BUDGET PRICING

IDI's current budget price for the complete DensaDeg® system described above, including freight to jobsite (within North America), is **$REP WILL ADVISE.** This price will be valid for 90 days. Our price is based on IDI's standard terms and conditions, which can be provided upon request.

7. PRODUCT BROCHURE

INFILCO

DENSADEG®

Clarifier / Softener

CLARIFICATION | PHOSPHOROUS REMOVAL | SOFTENING | INDUSTRIAL APPLICATIONS

← Applications

- Wastewater:
  - CSO/SSO
  - BOD, COD, TSS Reduction
  - Primary and Tertiary Clarification
  - Phosphorous Removal
  - Wastewater Reclamation
- Drinking Water:
  - Clarification and Softening
  - Membrane/Filter Backwash
  - Thickening
  - Organics Removal
- Industrial Water:
  - Process Water
  - Softening/Silica Removal
  - Metal Precipitation
  - FGD Wastewater

The DensaDeg® Clarifier/Thickener is a high-rate solids contact clarifier which combines optimized flocculation, internal and external sludge recirculation, and plate settling in two conjoined vessels.

MAIN FEATURES

- → High loading rate equals small footprint
- → Compact layout: Integration of clarification and thickening in a single system
- → Highly efficient use of chemicals
- → External sludge recirculation and high solids concentration reduces start-up time
- → Superior effluent quality
- → Thickener provides sludge storage and sludge thickening
- → Easily handles influent solids variations
- → No maintenance concerns related to abrasive wear by external ballast

SEPARATION TECHNOLOGY: DensaDeg® 2D CLARIFIER/THICKENER

The DensaDeg® Clarifier, Softener and Thickener is the water and wastewater industry's most robust, versatile process on the market. This high-rate system combines optimized flocculation, internal and external solids recirculation, thickening in two conjoined vessels to maximize hydraulic loading and treatment efficiencies. The proprietary blend of energy input and high volume solids recirculation reduces waste volumes and results in rapid settling operation and high quality treated water. The DensaDeg® process is proven in hundreds of installations on nearly all physical-chemical separation applications in the municipal drinking water, wastewater and industrial markets.

suez environnement

Degrémont

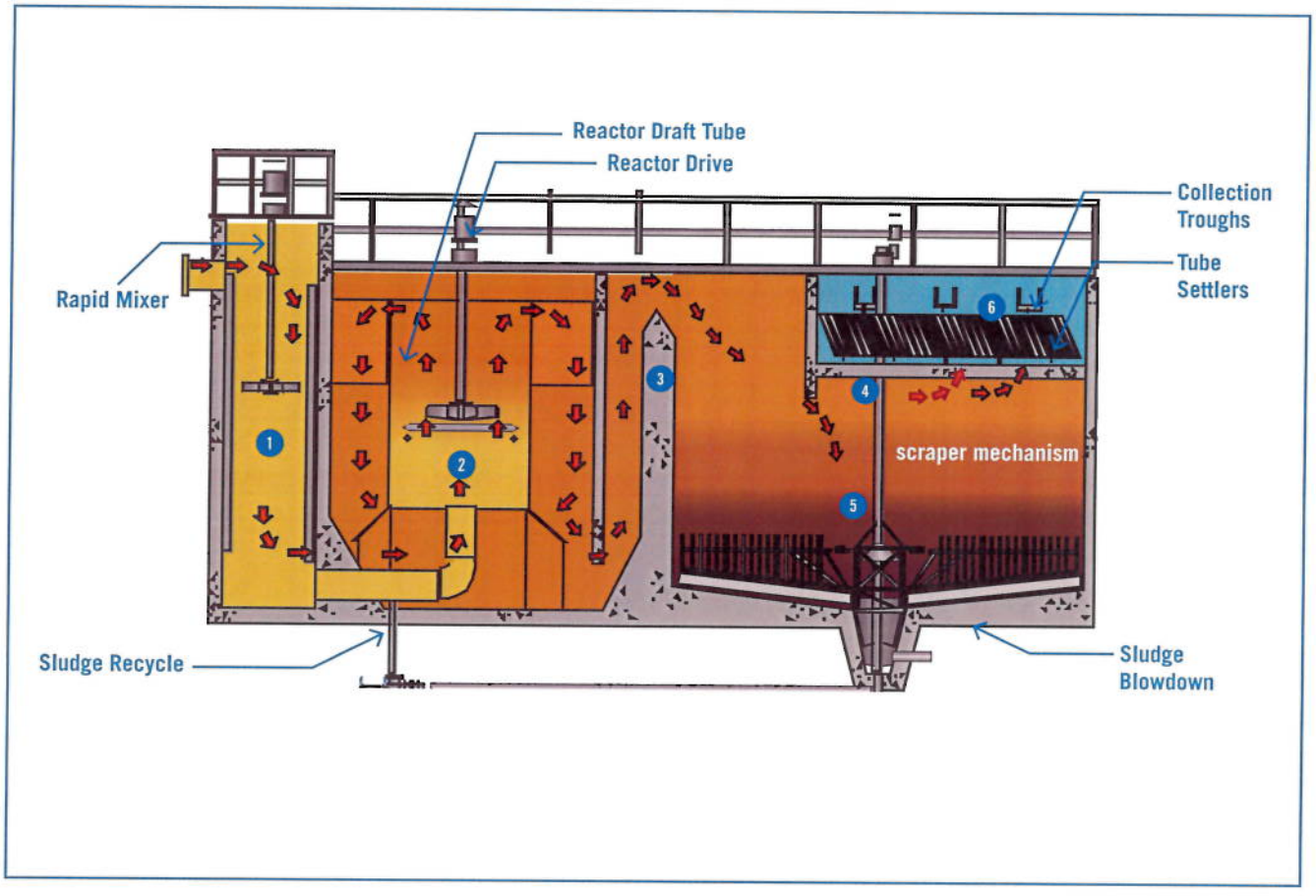
DENSADEG®

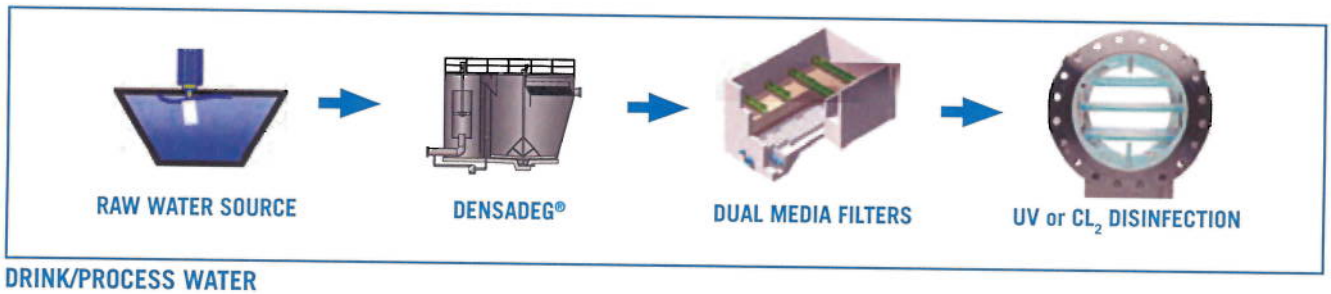
HOW IT WORKS

An Integrated Three-Stage Process

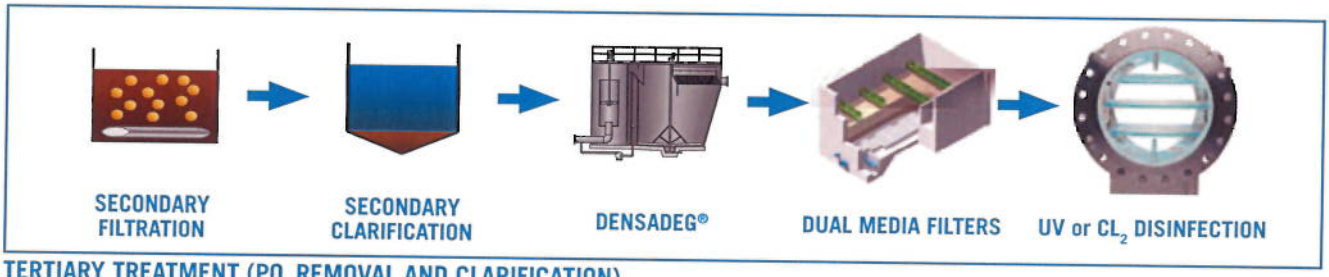
1. **RAPID MIX STAGE:** Raw water flows into the rapid (flash) mix zone where a coagulant is added. Coagulation is the destabilization of colloidal particles, which facilitates their aggregation and is achieved by the injection of a coagulant such as alum or ferric chloride.
2. **REACTOR ZONE:** Coagulated water then flows into a second reactor zone for intense internal recirculation and mixing by an axial-flow turbine. Water and solids are recirculated in and out of a cylindrical draft tube, promoting solids contact and particle growth. A flocculating agent (polymer) is injected inside the reactor draft, together with thickened sludge recycled from the thickening zone. The recycled sludge accelerates the flocculation process and ensures the formation of dense floc particles of homogeneous size.
3. **TRANSITION ZONE:** The transition to the settling stage is accomplished through an up-flow piston zone. Additional flocculation takes place in this zone, as dense particulate transitions upward and over an internal weir wall.
4. **SETTLING & SEPARATION ZONE:** Flocculated solids enter the settling zone, over a submerged weir wall, where dense, suspended matter settles to the bottom of the clarifier. Clarified water is displaced upward from the downward moving slurry, through inclined tube settlers. The tube modules act as a polishing step for lighter, low density solids.
5. **SLUDGE DENSIFICATION & THICKENING:** Settled sludge is thickened progressively in the bottom of the clarifier through the use of a rotating scraper mechanism. A small portion of this thickened sludge is recycled to the reactor zone and the remainder is periodically blown down through an automatic blowdown valve.
6. **EFFLUENT COLLECTION:** Uniform collection of clarified water is accomplished in effluent launders above the settling tube assembly.

DensaDeg®





DRINK/PROCESS WATER



TERTIARY TREATMENT (PO_4 REMOVAL AND CLARIFICATION)

PERFOMANCE ADVANTAGES

Excellent Effluent Quality
Combined solids recirculation and high reactor concentration optimize unit operation and overall treatment results.

Treated water turbidity is normally less than 1.0 NTU.
Tertiary phosphorous removal to less than 0.1 mg/l TP.

Construction Economy
Integrated functions within a single unit require approximately 50% less space than conventional solids contact clarifiers.

Accelerated and Optimal Chemical Efficiency
Combined internal and external sludge recirculation and high reactor solids concentration reduce startup time and chemical usage and increase treatment rates.

Thickened Sludge and Reduced Waste Volume
Thickened solids from 2 to 10% and extremely low waste volume.

Consistent, Flexible Performance
Hydraulic loading management and high reactor solids enables operation over a broad range of flows and raw water characteristics.

Long Service Life
No abrasive material is added to the system so there is no wear on pumps, mixers, or scrapers.

Technical Features

- → Loading Rates: 6.0 to 15.0 gpm/ft²
- → Steel tank or concrete units available
- → Highly efficient use of chemicals
- → Flexible layout options - Customize to any size plan
- → Unit heights of 15 to 22 feet
- → 10 times less waste volume vs. ballasted systems
- → No additional thickening equipment required
- → Automatic control of start-up, shutdown and sludge systems
- → No abrasive ballast material to handle, dispose of or replace
- → Enhanced TOC removal with softening

DESIGN SPECIFICATIONS

DensaDeg®	Single Unit Capacity
	MGD
Concrete Units	1.0 to 22
Steel Tank Units	0.15 to 15

DESIGN SPECIFICATIONS

- Concrete or Steel Tank construction
- Mechanism Internals: Painted carbon steel, stainless steel or special coatings

DENSADEG®

COMPLETE TREATMENT SOLUTIONS

Infilco Degremont offers an array of water, wastewater and industrial treatment solutions for any size client. Headworks, clarification, filtration, biological and disinfection systems are several of the product disciplines in our portfolio.

If interested in this product, check out some of the complementary SEPARATIONS products:

- Superpulsator® Clarifier
- AquaDAF® Clarifier
- Accelator® Clarifier/Softener
- Greenleaf Filter System
- Tetra™ Block Underdrains

With a variety of filtration and clarification products in our SEPARATIONS department, Infilco engineers carefully evaluate each application to provide the most cost-effective and efficient treatment solution.

- Monoflor® Nozzle Underdrains
- ABW® Automatic Backwash Filter
- PulsaPAK® Package Clarifier/Filter System
- AquaPAK Package Clarifier/Filter System
- AccelaPAK® Package Clarifier-Softener/Filter

PILOTING SERVICES

Infilco offers pilot systems and services for the equipment in this brochure as well as many of our other product offerings. Pilot studies are a practical means of optimizing physical-chemical and biological process designs and offer the client several benefits, such as:

- Proof of system reliability
- Optimal design conditions for the full-scale system
- Raw water lab analysis
- Regulatory approval assistance

If interested in a pilot study for your system, please contact us for a proposal.

SERVICES INFILCare®

Part Sales

Infilco Degremont sells parts and components for most INFILCO brand equipment as well as parts for demineralizers, thickeners, nozzles, pressure filters, and valves. We offer reliable spare parts at competitive prices. We maintain records of previous installations to quickly identify your requirements. Many items are shipped directly from stock for quick delivery.

Rebuilds, Retrofits and Upgrades

Infilco Degremont offers cost-effective rebuilds and upgrades for INFILCO provided systems, no matter what year they were built. If you are interested in an economical alternative to installing a whole new system, contact us for a proposal.

Contacts

WWW.DEGREMONT-TECHNOLOGIES.COM

Infilco Degremont Inc.
8007 Discovery Drive
Richmond, VA 23229-8605, USA
Tel: +1 804 756 7600
Fax: +1 804 756 7643
info-infilco@degtec.com

Degrémont Limitée
1375, route Transcanadienne,
Bureau 400
Dorval (Qc) H9P 2W8, Canada
Tel: +1 514 683 1200
Fax: +1 514 683 1203
info-canada@degtec.com

Manufacturers' Representative:

Meserve, Erik

From: King, Karla
Sent: Wednesday, January 13, 2010 4:59 PM
To: Meserve, Erik
Subject: FW: Newport, NH - Pilot Study Report

Karla L. King, P.E.
Project Engineer - WATER
1231 Concord, MA
D 978.371.4156 C 978.496.0179
karla.king@aecom.com

AECOM
300 Baker Avenue, Suite 290
Concord, Massachusetts 01742
T 978.371.4000 F 978.371.2468
www.aecom.com

-----Original Message-----
From: Jim DeLuca [mailto:jdeluca@aquasolutionsinc.net]
Sent: Wednesday, January 13, 2010 4:45 PM
To: King, Karla; Gerry.GUTHRIE@infilcodegremont.com
Subject: RE: Newport, NH - Pilot Study Report

Karla,

My apologies for the delay:

Budget price for two (2) #8 concrete DensaDeg units, 4.0 MGD total flow, is $740,000.

Any questions or comments, let me know.

Regards,

Jim DeLuca (jdeluca@aquasolutionsinc.net) Aqua Solutions, Inc.
154 West Grove Street
Unit D
Middleboro, MA 02346
Phone # 508-947-5777
Fax # 508-861-0733
Cell # 617-480-9643
Website: www.aquasolutionsinc.net.

-----Original Message-----
From: King, Karla [mailto:Karla.King@aecom.com]
Sent: Wednesday, January 13, 2010 4:31 PM
To: Gerry.GUTHRIE@infilcodegremont.com
Cc: jdeluca@aquasolutionsinc.net
Subject: RE: Newport, NH - Pilot Study Report

Gerry/Jim,

Still have not seen any pricing on this. I believe Jim was going to get something to me.

Please send as soon as possible.

Thanks, Karla

Karla L. King, P.E.
Project Engineer - WATER
1231 Concord, MA
D 978.371.4156 C 978.496.0179
karla.king@aecom.com

AECOM
300 Baker Avenue, Suite 290
Concord, Massachusetts 01742
T 978.371.4000 F 978.371.2468
www.aecom.com

-----Original Message-----
From: Gerry.GUTHRIE@infilcodegremont.com
[mailto:Gerry.GUTHRIE@infilcodegremont.com]
Sent: Wednesday, December 23, 2009 1:26 PM
To: King, Karla
Subject: RE: Newport, NH - Pilot Study Report

Karla,

Here is the budget proposal for Newport. Jim DeLuca has the pricing, and he will be in contact with you.

(See attached file: Newport DensaDeg Budget Proposal (12.23.09).pdf)(See attached file: section view.pdf)(See attached file: plan view.pdf)

--

Gerry GUTHRIE

APPLICATION ENGINEER

INFILCO DEGREMONT INC.

(Embedded image moved to file: pic28486.jpg)

8007 Discovery Drive
RICHMOND - VIRGINIA - 23229 -
UNITED STATES

DL : +804 7567623
FAX : +804 7567643
MOB : +804 7679090

www.degremont-technologies.com

Imprimer cet email est-il vraiment nécessaire ?
Do you really have to print this email ?

"King, Karla" <Karla.King@aecom.com>

12/21/2009 02:55 PM

To <Gerry.GUTHRIE@infilcodegremont.com>

cc <ryan.hess@infilcodegremont.com>, <jdeluca@aquasolutionsinc.net>

Subject RE: Newport, NH - Pilot Study Report

Gerry,

Answers below. Thanks and have a very Happy Holiday!

KK

Karla L. King, P.E.
Project Engineer - WATER
1231 Concord, MA
D 978.371.4156 C 978.496.0179
karla.king@aecom.com

AECOM
300 Baker Avenue, Suite 290
Concord, Massachusetts 01742
T 978.371.4000 F 978.371.2468
www.aecom.com

-----Original Message-----
From: Gerry.GUTHRIE@infilcodegremont.com [mailto:Gerry.GUTHRIE@infilcodegremont.com]
Sent: Monday, December 21, 2009 1:53 PM
To: King, Karla
Cc: ryan.hess@infilcodegremont.com; jdeluca@aquasolutionsinc.net

Subject: RE: Newport, NH - Pilot Study Report

Karla,

We have some questions regarding the full-scale design:

1. We understand the average flow as 0.7 MGD with a plant daily average of 1.3 MGD. What flow parameters do you want us to design for?

Average flow of 1.3 mgd, max day of 4.5, peak of 8.3 mgd.

2. How many units do you want? 1 or 2? We can meet the flow requirements with several configurations, and we would prefer to price our proposal as competitively as possible. Kruger uses one, IDI will use one. Kruger uses two, IDI can propose two. We generally don't make this recommendation as we are not familiar with the redundancy requirements per state/city.

Two units

3. Our DensaDeg comes in both concrete basins (by Others) and steel tanks (by IDI). Which MOC do you want?

Concrete

I will put everything together this afternoon.

Thanks.

--

Gerry GUTHRIE

APPLICATION ENGINEER

INFILCO DEGREMONT INC.

(Embedded image moved to file: pic00475.jpg)

8007 Discovery Drive
RICHMOND - VIRGINIA - 23229 -
UNITED STATES

DL : +804 7567623
FAX : +804 7567643
MOB : +804 7679090

www.degremont-technologies.com

nécessaire ?
Do you really have to print this email ?

"King, Karla" <Karla.King@aecom.com>

12/21/2009 11:05 AM

To <Gerry.GUTHRIE@infilcodegremont.com>

cc <ryan.hess@infilcodegremont.com>, <john.dyson@infilcodegremont.com>, <Bryce.CARTER@infilcodegremont.com>

Subject RE: Newport, NH - Pilot Study Report

Gerry,

Thanks. When can we expect the full-scale proposal?

KK

Karla L. King, P.E.
Project Engineer - WATER
1231 Concord, MA
D 978.371.4156 C 978.496.0179
karla.king@aecom.com

AECOM
300 Baker Avenue, Suite 290
Concord, Massachusetts 01742
T 978.371.4000 F 978.371.2468
www.aecom.com

-----Original Message-----
From: Gerry.GUTHRIE@infilcodegremont.com [mailto:Gerry.GUTHRIE@infilcodegremont.com]
Sent: Friday, December 18, 2009 4:16 PM
To: King, Karla
Cc: ryan.hess@infilcodegremont.com; john.dyson@infilcodegremont.com; Bryce.CARTER@infilcodegremont.com
Subject: RE: Newport, NH - Pilot Study Report

Karla,

Here is the pilot report for Newport, NH. Please let us know if you have any questions.

(See attached file: IDI DensaDeg Pilot Report - Newport, NH (12.18.09).pdf)

Thanks.

--

Gerry GUTHRIE

APPLICATION ENGINEER

INFILCO DEGREMONT INC.

(Embedded image moved to file: pic14721.jpg)

8007 Discovery Drive
RICHMOND - VIRGINIA - 23229 -
UNITED STATES

DL : +804 7567623
FAX : +804 7567643
MOB : +804 7679090

www.degremont-technologies.com

"King, Karla" <Karla.King@aecom.com>

12/18/2009 12:18 PM

To <Gerry.GUTHRIE@infilcodegremont.com>

cc <ryan.hess@infilcodegremont.com>

Subject RE: Newport, NH - Pilot Study

Gerry,

Is everything on schedule for us to receive the pilot study report today?

Karla

Karla L. King, P.E.
Project Engineer - WATER
1231 Concord, MA
D 978.371.4156 C 978.496.0179
karla.king@aecom.com

AECOM
300 Baker Avenue, Suite 290
Concord, Massachusetts 01742
T 978.371.4000 F 978.371.2468
www.aecom.com

-----Original Message-----
From: Gerry.GUTHRIE@infilcodegremont.com
[mailto:Gerry.GUTHRIE@infilcodegremont.com]
Sent: Tuesday, December 15, 2009 9:48 AM
To: King, Karla
Cc: ryan.hess@infilcodegremont.com
Subject: Re: Newport, NH - Pilot Study Report

Karla,

We have the draft copy done. Our Pilot Eng. is travelling until Thursday, so we will try to send the final copy Friday.

--

Gerry GUTHRIE

APPLICATION ENGINEER

INFILCO DEGREMONT INC.

(Embedded image moved to file: pic02865.jpg)

8007 Discovery Drive

RICHMOND - VIRGINIA - 23229 -
UNITED STATES

DL : +804 7567623
FAX : +804 7567643
MOB : +804 7679090

www.degremont-technologies.com

Imprimer cet email est-il vraiment nécessaire ?
Do you really have to print this email ?

"King, Karla"
<Karla.King@aecom.com>

12/15/2009 09:46 AM

To
<Gerry.GUTHRIE@infilcodegremont.com>, <ryan.hess@infilcodegremont.com>
cc
"King, Karla"
<Karla.King@aecom.com>
Subject
Newport, NH - Pilot Study Report

Gerry/Ryan,

What is the status of the Newport, NH Pilot Study Report?

Thanks, Karla

Karla L. King, P.E.
Project Engineer - WATER
1231 Concord, MA
D 978.371.4156 C 978.496.0179
karla.king@aecom.com

AECOM
300 Baker Avenue, Suite 290
Concord, Massachusetts 01742

T 978.371.4000 F 978.371.2468
www.aecom.com

KRÜGER

I. Kruger Inc.
401 Harrison Oaks Boulevard - Suite 100
Cary, NC 27513

TELEPHONE 919-677-8310
FACSIMILE 919-677-0082

January 21, 2010

Karla L. King, P.E.
Project Engineer – WATER
AECOM
300 Baker Avenue, Suite 290
Concord, Massachusetts 01742

Re: Revised Discfilter Proposal for Newport WWTP, NH
Kruger Project No: 42290905

Dear Ms. King:

Enclosed please find our revised Discfilter system proposal and detailed Scope of Supply for the above-referenced project. The system is designed to provide solids removal to a final TP effluent average concentration of ≤0.35 mg/L.

Option One: The Discfilter system shall include two (2) units of model HSF2218-1F to filter an average flow (ADF) of 0.85 MGD (590 gpm) and peak hourly flow (PHF) of 6.0 MGD (4,167 gpm). The sizing allows redundancy at the ADF due to large PHF. The Discfilter units will be constructed of stainless steel and will include stainless steel tanks or installed in concrete basins.

Option Two: The Discfilter system shall include two (2) units of model HSF2218-2F to filter an average flow (ADF) of 0.85 MGD (590 gpm) and peak hourly flow (PHF) of 6.0 MGD (4,167 gpm). The sizing allows redundancy at the ADF due to large PHF. The Discfilter units will be constructed of stainless steel and will include in concrete basins.

The upstream lagoon process will require adding a tertiary coagulation/flocculation system ahead of the Discfilter. Direct dosing of metal salt and/or polymer into the pipe preceding the filter is not recommended. Appendix 2 contains the recommended design criteria for a tertiary flocculation/coagulation system. As requested, Kruger has included the tertiary coagulation/flocculation system as an adder.

Where chemical addition is practiced for phosphorus removal, an automated cleaning system (ACS) is recommended to minimize operator maintenance associated with periodic cleaning. An ACS is included in the attached scope.

Kruger's Scope of Supply for this project includes the filters, local control panels, backwash pump, mixers, chemical cleaning skid, engineering support, freight, start-up services, spare parts and one-year warranty for each unit supplied. Pricing is valid for ninety (90) days from the date of this proposal. Please refer to our attached terms of sale. Our budgetary sales prices are as follows:

Option One: $734,000
Option Two: $668,400
Tertiary Coagulation/Flocculation System: $124,000

VEOLIA WATER
Solutions & Technologies

Kruger appreciates the opportunity to provide this proposal to you. If you have any questions or need any additional information, please contact either Todd Hathaway or me. Todd can be reached at 919-677-8310 or todd.hathaway@veoliawater.com. My contact information is listed below.

Best regards,

Brandon Ray
Application Engineer
(919) 653-4592 Direct
(919) 677-8310 Main
(919) 677-0082 Fax
brandon.ray@veoliawater.com

ENC

cc: Rep – Dennis Geran – FR Mahony
Project File

Discfilter Proposal
For
Newport WWTP, NH

Submitted
January 21, 2010

By

I. Kruger Inc.
401 Harrison Oaks Boulevard, Suite 100
Cary, NC 27513

Phone: 919-677-8310 Fax: 919-677-0082

I. Summary

Kruger is pleased to present our proposal for Kruger/Hydrotech Discfilter technology. The Kruger/Hydrotech Discfilter presents several advantages compared to other filtration technologies. These advantages include:

- Compact footprint.
- Minimal mechanical equipment.
- Simple automated control system.
- Easy maintenance without the need to drain the system.
- Typical head-loss through filter: Normal 8-10"

The following Kruger/Hydrotech Discfilter design is based on the information listed below. Table 1 summarizes the influent and effluent design criteria for this project.

Table 1: Influent & Effluent Design Criteria

Wastewater Composition	
Peak Hourly Flow, MGD (gpm)	6.00 (4,167)
Peak Day Flow, MGD (gpm)	1.40 (972)
Average Daily Flow, MGD (gpm)	0.85 (590)
Peak Influent TSS, mg/L	≤30
Average Influent TSS, mg/L	≤10
Average Effluent TSS, mg/L	≤10
Average Effluent TP, mg/L	≤0.35

Note: To meet the required effluent parameters, the process will require a tertiary coagulation and flocculation process ahead of the discfilter units design in accordance with the guidelines contained in Appendix II.

II. Scope of Supply

Kruger is pleased to present the following detailed scope. The work will be performed to Kruger's high standards under the direction of a project engineer. All matters related to the design, installation, or performance of the system shall be communicated through our representative, giving the engineer and owner ready access to Kruger's extensive capabilities.

1. **Field Services** – Kruger will furnish a Service Engineer as specified at the time of start-up to inspect the installation of the completed system, place the system in initial operation and to instruct operating personnel on the proper use of the equipment. Specifically, Kruger will provide:

   - On-site equipment checkup, start-up assistance and operator training for a period not exceeding four (4) man days and two (2) site visits.

2. **Equipment** – Kruger will supply the following equipment associated with the system:

- Two (2) Model HSF2218-1F units or two (2) model HSF2218-2F disc filtration units each inclusive of:
  - 304 stainless steel frame construction.
  - Filter discs with filter elements.
  - One drive motor.
  - One (1) backwash pump with interconnecting piping.
  - Local control system for automatic backwash with control panel, including starters/motor protector, VFD for soft start (if applicable) and manual speed control of filter, liquid level relay and installed level sensor. The Discfilter will backwash automatically via a PLC controller. The PLC will monitor the liquid level relay for backwash level and backwash accordingly. The PLC will also monitor and control backwash duration and frequency.
  - Separate External Filter Bypass
    - Tank (1F): influent will flow into a bypass chamber within the influent side of the unit during bypass condition; unfiltered water will exit via bypass flange without contaminating the filtered effluent.
    - Concrete (2F): a separate bypass channel should be installed along the influent channel (provided by others) to allow for diversion of unexpected high inlet water level without contamination of the filtered effluent.

- One fully automated skid mounted chemical cleaning system for Discfilter inclusive of day tank, spray pump, motor actuated valves, and control panel.

Table 2 and Table 3 summarize the equipment to be provided.

Table 2: Filter Equipment

Number of Discfilter units:	2
Discfilter Model:	HSF2218-1F or HSF2218-2F
Drum:	
Material	SS304
Disc:	
Material	ABS
Filter element:	
Frame material	SS304
Filter media	Woven Polyester
Filter pore size, µm	10
Number of discs installed per unit	18
Total filter area per unit, ft^2	1,085
Submerged filter area per unit, ft^2	705
Hydraulic Loading Rate at peak flow, gpm/ft^2	2.95
Drive system:	
Gearbox and motor manufacturer	SEW Eurodrive
Filter motor	1.5 Hp, 480V, 3-phase, 60Hz
Back-wash pump:	
Rinse water pump type	
Pump motor	15 Hp, 480V, 3-phase, 60Hz
Capacity at 110 psi	119 gpm
Covers:	
Material	GRP
Tank:	
Material	1F Design: SS304 Tank Units 2F Design: Filters installed in concrete basins (provided by others)

Table 3: Chemical Cleaning Skid

Day Tank	
Polyethylene with high/low float switch	150 gal
Spray Pump	
Mag Drive Centrifugal	12 GPM at 40 PSI
Skid Piping	
Associated piping and fittings (PVC -Skid only)	1 Lot
Back Pressure/Bypass valve (acid resistant)	1
Pump Isolation Ball Valves (PVC – acid proof)	2
Motor actuated Ball Valves (outlet to filter)	4
Pulsation Dampener	1
Inline strainer	1
Local Control Panel	1
NEMA 4X Fiberglass w/ HOA switches, indicator lights, etc.	

Tertiary Coagulation and Flocculation Equipment:

- One (1) high speed vertical mixer, impeller and shaft 304 SS Spare parts include 1 set of bearings and seals for each mixer
- Two (2) low speed vertical mixers inverter duty motors, impeller and shaft 304 SS. Spare parts include 1 set of bearings and seals for each mixer
- Two (2) variable frequency drives with NEMA 12 enclosure
- Liquid Polymer Make-up and Metering System inclusive of high shear dispersion device, metering pumps, calibration column, skid associated piping and valves, local control panel
- Coagulant metering skid volumetric metering pumps metering pumps, calibration column, skid associated piping and valves, local control panel
- One (1) master PLC control panel, Contrologix or Micrologix in NEMA 12 Panel (Indoor use)

Table 5 through Table 7 summarizes the Tertiary Coagulation/Flocculation Equipment which can be provided by Kruger.

Table 5: Tertiary Coagulation/Flocculation Zones

Rapid Mix Zone	
HRT, minutes @ peak daily flow	≈0.4
Volume (gal)	400
Number of vertical mixers, high speed	1
Estimated Power Consumption, Kw	<1
Coagulation Zone	
HRT, minutes @ peak hourly flow	≈8.7
Volume (gal)	8,500
Number of vertical mixers, slow speed	1
Estimated Power Consumption, Kw	1.6
Flocculation Zone	
HRT, minutes @ peak day flow	≈8.7
Volume (gal)	8,500
Number of vertical mixers, slow speed	1
Estimated Power Consumption, Kw	1.0

Table 6: Coagulant Feed Skid

Day Tank	
Polyethylene tank with high/low float switch (By Others)	1,000 gal
Metering Pumps	2
Skid Piping	
Associated piping and fittings (PVC -Skid only)	1 Lot
Back Pressure/Bypass valve (acid resistant)	1
Pump Isolation Ball Valves (PVC – acid proof)	4
Calibration Column	1
Inline strainer	1
Local Control Panel	1
NEMA 4X Fiberglass w/ HOA switches, indicator lights, etc.	

Table 7: Polymer Makeup Skid

Polymer Makeup Systems	
Neat Polymer Pumps	1
Polymer Dispersion Device	1
Rotameter for dilution/makeup water flow control	1
Solenoid Valve for makeup water injection	1
Skid Piping	
Associated piping and fittings (PVC -Skid only)	1 Lot
Back Pressure/Bypass valve	1
Pump Isolation Ball Valves (PVC	4
Calibration Column	1
Solenoid Valve for dilution/carrier water injection	
Local Control Panel	1
NEMA 4X Fiberglass w/ HOA switches, indicator lights, etc.	

**Design is based upon Liquid Polymer System. Design for Dry Polymer System may be advantageous due to more flexibility with lower feed rates. Kruger can provide design for Dry Polymer System upon request.*

3. **Delivery Terms** – Deliverables will be supplied as detailed below:

- Shop drawings will be submitted within 6 weeks of receipt of an executed contract.
- All equipment will be delivered within 18-20 weeks of receipt of approved shop drawings.
- Operation and Maintenance Manuals will be furnished 30 days prior to delivery of equipment.

4. **Warranty** – The equipment will be supplied with our standard warranty detailed below:

- One-year warranty (twelve (12) months from beneficial use or eighteen (18) months from delivery which ever occurs first) on Discfilter parts and materials as detailed in the attached terms of sale.

Appendix 1

Drawings

VEOLIA
WATER
Solutions & Technologies